such gigantic concerns as Meister, Lucius, and Brüning, and the Badische Anilin und Soda Fabrik, with their thousands of workmen, their splendidly equipped laboratories, and their scores of well-trained investigators, the product of the most advanced chemical instruction that the most eminent teachers in the world can impart, is a sufficient indication of what "the scientific treatment of a practical subject" leads to.

Some days after his visit to Ludwigshafen, the writer met Prof. von Baeyer at Munich, and the talk was of Höchst and Ludwigshafen, and the influence which these and many such places must have on the industrial position of Germany. "And do you know to whom we owe all this?" asked Baeyer. There was but one answer: "To Liebig." "You are right. It is to Liebig and the Giessen laboratory." What the Augustinian cell at Wittenberg was to German theology, the little University laboratory was to German chemical science.

> "The foundation of this school," says Hofmann, who was himself one of its products, "forms an epoch in the history of chemical science. It was here that experimental instruction, such as now prevails in our laboratories, received its earliest form and fashion; and if at the present moment we are proud of the magnificent temples raised to experimental science in all our [German] schools and Universities, let it never be forgotten that they all owe their origin to the prototype set up by Liebig half a century ago."

Bureaucracies, being human institutions, have occasionally been known to err, but that bureaucrat who—by recalling the two Prussian students who had dared to seek the instruction in Hesse-Darmstadt which they failed to get in their own State—raised the storm of indignation which found eloquent expression in the famous letters that roused Germany and Austria to a sense of what science could do for their material interests, has deserved a better fate than oblivion.

T. E. Thorpe.

DIPHTHERIA.

Diphtheria: its Natural History and Prevention. By R. Thorne Thorne, M.B., F.R.S., &c. (London: Macmillan and Co., 1891.)

THE volume before us is a republication of the Milroy Lectures, delivered by Dr. Thorne Thorne before the Royal College of Physicians in London, 1891; and all must heartily congratulate the author on the ability with which he discusses a complex and vastly important subject, and at the same time must be grateful to him for having, by republication in a handsome form, made these lectures accessible to a larger public.

Diphtheria is an infectious disease which was known before the Christian era, and was fully recognized and well described by Bretonneau in 1821. In this country it has of late years undergone, both as to its diffusion and mortality, a remarkable increase. While in former years diphtheria was considered a purely "rural" disease, of late years its repeated occurrence in large towns has raised it to an "urban" disease; so much so that, "while the metropolitan (death) rate (from diphtheria) for 1861–70 was lower than that for the country generally, it exceeded it during the two next periods, and the rise which has taken place in the rate for 1881–89 is far in excess of the corresponding one for England and Wales." "There is thus far evidence that diphtheria as a cause of death is increasing in the country as a whole, and that this increase is very conspicuous in our greatest urban community" (p. 5). It is significant that, "concurrently (pp. 80–81) with the diminution of enteric fever, owing to advance of knowledge in the principles of health, and with the resulting intelligent administration of our sanitary laws, we find that the diphtheria death-rate is increasing in our midst." "But it is, above all, in our large towns and cities that this enlightened sanitary policy has been most marked during the past twenty years; . . . and yet, whereas when, in the past, sanitary defects abounded in our large centres of population diphtheria was essentially a disease of rural districts, that disease is now invading our more cleanly towns and cities to an extent unknown in the annals of their more faulty past."

Now, what is this increase of diphtheria in general, and the "formidable" increase in the London mortality from diphtheria in particular, due to? Although Dr. Thorne abstains from supplying a direct answer to this question, an attentive reader, after perusal of the enormous body of facts which Dr. Thorne produces, will be in a position to draw his own conclusions. This increase is certainly not to be explained by the better recognition and more correct classification of the disease (in the earlier returns of the Registrar-General certain forms of scarlatina, true diphtheria, and certain non-diphtheritic forms of croup are not well distinguished, in the later returns the distinction is carefully carried out), nor can this increase, obviously, be due to any new condition as to soil, water, and air. Dr. Thorne passes in review, and illustrates by numerous examples, collected by the most competent sanitary officers and inspectors, and minutely described in the Reports of the Medical Officer of the Local Government Board, the various conditions that have been, or were suggested as having been, connected with the origin and spread of various diphtheria outbreaks in this country; and a careful perusal of the immense body of facts recorded in this volume must impress the reader, not only with the great caution with which Dr. Thorne draws his conclusions, but with the admirably impartial way in which he tells his story, and in which he pays due regard to every detail, be it for or against. The one fact which above all others stands out prominently, and which it behoves everyone connected with our present system of compulsory school attendance carefully to consider, is the unmistakable influence of "school attendance" on diphtheria. Not the fact that diphtheria spreads from a child affected with diphtheria to another child with which it is brought in contact, either at school or at play or otherwise—a fact only too well known and unfortunately often enough actually illustrated; but the fact that "school influence"—that is, an influence affecting children aggregated in a confined space—has an important bearing on the generation of true diphtheria. This "'school influence' tends to foster, diffuse, and enhance the potency of diphtheria; and this, in part at least, by the aggregation of children suffering from that sore throat which commonly is prevalent antecedent to, and concurrently with, definite diphtheria" (p. 219). Dr. Thorne devotes a considerable portion of chapter iii. to the consideration and discussion of this important subject,

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and brings forward evidence, collected by himself before and after 1878, and by a number of well-known health officers and co-workers (Mr. W. H. Power, Dr. David Page, Dr. Jacob, Dr. Bruce Low, and others), which conclusively proves and confirms Dr. Thorne's proposition, first enunciated by him in 1878. Over and over again has it been shown (chapter iii.) that, in schools frequented by children some of whom were affected with simple sore throat, outbreaks of true diphtheria have occurred, for the explanation of which no antecedent case of diphtheria, nor any of the generally assumed insanitary conditions, could be brought forward. It is on these grounds that Dr. Thorne justly insists on a continued and careful inspection of the throats of the children, and on immediate separation from school of any child affected with sore throat.

The part that milk plays in the dissemination of diphtheria is fully discussed, and illustrated by a number of epidemics that have been recorded in the Reports of the Medical Officer of the Local Government Board; and the important relation of diseases of the lower animals, particularly of cows and cats, is also described and illustrated by epidemics in chapter iv. Last, but not least, Dr. Thorne considers the question of prevention and isolation. By his office as Assistant Medical Officer of the Local Government Board, and from an experience extending over many years, he stands in the unique position of the very best authority, whose conclusions and recommendations deserve carefully to be studied by managers and owners of schools, by hospital authorities, by sanitary officers and Boards of Health, by the owners of dairies, and by all those to whom the health of the community ought to be of paramount importance.

THE NEW YORK MATHEMATICAL SOCIETY.

Bulletin of the New York Mathematical Society, a Historical and Critical Review of Mathematical Science. Vol. I. No. 1, October 1891. (New York: for the Society.)

WE have occasionally wondered that now the study of mathematics is so diligently and successfully prosecuted across the Stream, there was no Society to bring together all such persons as were willing "to encourage and maintain an active interest in mathematical science." The "Organization of the New York Mathematical Society" gives a list of 174 members, mostly Professors of Mathematics or Astronomy. The President is Mr. Emory McClintock, a Vice-President of the Actuarial Society of America, who is also a member of the London Mathematical Society, and a contributor of some excellent memoirs to the *American Journal of Mathematics.* The constitution embraces six articles, and there are ten by-laws. These are apparently founded upon the rules which have been drawn up for other similar Societies. The date of the pamphlet (*i.e.* the "Organization, &c.," cited above) is June 1891. From a circular we gather that the Society has only recently inaugurated the present state of affairs, for this document states:—

"The New York Mathematical Society has consisted in the past of most of the professors and instructors of mathematics at the several Colleges situated in New York and the vicinity, the actuaries of a few of the larger life insurance companies, and a number of other persons interested in higher mathematics. At present an extension of membership is in progress."

Then it goes on to say:—

"The Society is about to undertake the publication of a periodical review of pure and applied mathematics. The idea is not to enter into any competition with the *American Journal of Mathematics*, the *Annals of Mathematics*, or any other similar journal, but it is proposed to publish, primarily, historical and critical articles, accounts of advances in different branches of mathematical science, and reviews of important new publications; also *résumés* of lectures before the Society, short contributions from members and correspondents, and general mathematical news and intelligence. Such a periodical, if circulated extensively, will do much to incite an interest in mathematical studies, and to maintain the interest of those who, having pursued such studies, are now perhaps at a distance from others of like tastes and training. It will appeal to many that our mathematical journals do not reach."

We have allowed the Society to state its aims: these have been sanctioned by Profs. Newcomb, Woolsey Johnson, and Craig (associate editor of the *American Journal of Mathematics*). We wish the Society every success in their endeavour "to promote a long-needed spirit of active co-operation, and to establish a bond of union between American mathematicians."

The *Bulletin* contains an article on "Octonary Numeration," by Prof. Woolsey Johnson. The concluding paragraph is as follows:—

"As there is no doubt that our ancestors originated the decimal system by counting on their fingers, we must, in view of the merits of the octonary system, feel profound regret that they should have perversely counted their thumbs, although Nature had differentiated them from the fingers sufficiently, she might have thought, to save the race from this error."

The rest of the number is taken up with reviews of several books, viz. "The Teaching of Elementary Geometry in German Schools" (review of Schotten's "Inhalt und Methode des planimetrischen Unterrichts," by Prof. Ziwet); Bertrand's "Calcul des Probabilités" (by Prof. Ellery Davis); Fine's "Number-System of Algebra" (by G. Eneström, of Stockholm); and notices of works on West African longitudes and South American longitudes (by the treasurer, H. Jacoby). There are several short notes and a translation of Picard's demonstration of the general theorem upon the existence of integrals of ordinary differential equations (by the secretary, T. S. Fiske).

From this account it will be seen that there are no mathematical memoirs read before the Society in this part, but that such papers have been communicated we learn from the fact that three are printed in the current number of the *American Journal of Mathematics*, viz. one by C. Steinmetz (February 6, 1891), and two by the President (March 6, 1891).

OUR BOOK SHELF.

Delagoa Bay: its Natives and Natural History. By Rosa Monteiro. With Twenty Original Illustrations after the Author's Sketches and from the Natural Objects by A. B. and C. E. Woodward. (London: George Philip and Son, 1891.)

BOTANISTS and zoologists alike will remember the services rendered to science by the late J. J. Monteiro,

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